REMARKS

The Office Action mailed February 2, 2006 has been carefully reviewed along with the reference cited therein. In the subject Office Action, the Examiner objected to claim 35. The Examiner rejected claims 1-16 and 28-30 under § 103(a) as being unpatentable over U.S. Patent No. 6,357,983 (Belliveau) in view of U.S. Patent No. 5,008,582 (Tanuma et al.). The Examiner rejected claim 31 as being unpatentable over Belliveau in view of Tanuma et al., as applied to claim 28, and further in view of U.S. Patent No. 4,501,319 (Edelman et al.). The Examiner rejected claims 34 and 35 as being unpatentable over Belliveau in view of U.S. Patent No. 6,588,497 (Glezer et al.). The Examiner indicated that claims 17-25, 26-27, 32 and 33 include allowable subject matter. Applicant appreciates the indication of allowable subject matter.

An interview was conducted on April 25, 2006 with Jonathan A. Withrow representing Applicant and Jason Han and Alan Cariaso from the Patent Office. Applicant forwarded a draft of the subject amendment for their review. The Examiners indicated that it appeared that Applicant's arguments overcame the rejections presented in the subject Office Action, but that a new search would be performed.

Claim 35 has been amended to overcome the Examiner's claim objection.

The Examiner rejected claims 1-16 and 28-30 as being unpatentable over Belliveau in view of Tanuma et al. The Examiner's combination of these two references was improper. As shown below, when one considers each of the references as a whole, one skilled in the art would not combine Belliveau and Tanuma et al.

The invention in Belliveau is directed to providing "an inexpensive method of converging and diverging a plurality of light sources by mounting the light sources to a flexible substrate that may be deformed to change the angular relationship of the plurality of light sources." Col. 2, lines 20-24. The object of the invention in Tanuma et al. is "to provide an improved electronic device having fans fixed directly therein for cooling only that device." Col. 1, lines 66-68. Not only would the piezoelectric fans taught by Tanuma et al. be unable to provide the amount of airflow sought by Belliveau, but fixing the fans of Tanuma et al. directly to the flexible substrate of Belliveau, to maintain the desired cooling effect taught by Tanuma et al., would greatly reduce the flexibility of the flexible substrate in Belliveau. With a plurality of fans attached to the flexible substrate, the flexible substrate in Belliveau would be unable to be deformed to change the angular relationship of the

plurliaty of light sources. The intended function of the invention in Belliveau would be destroyed if one were to combine the cooling system that is taught by Tanuma et al. with the flexible substrate of Belliveau.

Additionally, the piezoelectric fans that are disclosed in Tanuma et al. would not be able to generate the air flow that is desired in Belliveau. FIGS. 9B and 12C of Belliveau disclose a fan 1217 (FIG. 9B) and 2270 (FIG. 12C). The fan that is shown in both figures is a rotary fan "that provides a vacuum in the housing 1218 (FIG. 9B) pulling air through the ventilation holes in the substrate 1212." Col. 17, lines 25-28. A very similar arrangement is disclosed in FIG. 12C.

Tanuma et al. recognize that "[e]lectronic devices assembled on the printed circuit boards usually are air cooled using a blower to eliminate the heat generated during the operation of electronic devices." Col. 1, lines 18-21. Tanuma et al. also teach that using a blower, i.e. the fan that is disclosed in Belliveau, leads to problems (see col. 1, lines 26-43). Tanuma et al. attempt to solve this problem by providing "an improved electronic device having fans fixed directly therein for cooling only that device." Col. 1, lines 66-68. These fans are not only too small to generate the airflow that is desired by Belliveau, but would also be incapable of generating sufficient directional airflow without a substantial reconstruction and redesign of the elements shown in Belliveau, the Examiner's primary reference, as well as a change in the basic principle under which Belliveau was designed to operate. *See* MPEP 2143.01 (THE PROPOSED MODIFICATION CANNOT CHANGE THE PRINCIPLE OF OPERATION OF A REFERENCE).

As explained in Engineers create tiny, wiggling fans to cool future electronics, Purdue News, which was submitted with Applicant's original IDS, piezoelectric fans will not replace rotary fans ("The innovative fans will not replace conventional fans." page 2 of printout) One main reason why piezoelectric fans will not simply replace conventional fans, such as the rotary fan disclosed in Belliveau, is that piezoelectric fans produce complicated circulation patterns, which is precisely opposite from rotary fans (rotary fans typically create laminar flow nearly upstream and downstream from the fan by pushing the air). See third page of printout from Purdue News article. Accordingly, the Examiner's simple substitution of the rotary fan disclosed in Belliveau with the piezoelectric fans disclosed in Tanuma et al. was improper since it would require a substantial redesign of the elements shown in Belliveau.

In view of the above, Applicant respectfully submits that one skilled in the art would not combine Belliveau with Tanuma et al. Accordingly, the Examiner has failed to establish prima facie obviousness with respect to claims 1-16 and 28-30.

The Examiner also rejected claims 34 and 35 as being unpatentable over Belliveau in view of Glezer et al. The Examiner's combination of these two references was also improper. As shown below, when one considers each of the references as a whole, one skilled in the art would not combine Belliveau and Glezer et al.

The Examiner is correct when quoting Glezer et al., "Traditionally, the need for cooling microelectronic devices has been met by using forced convective cooling with or without heat sink devices." Col. 1, lines 38-41. This statement, however, does not provide a basis for combining Belliveau and Glezer et al. When discussing traditional fans in the BACKGROUND OF THE INVENTION section, which is where the previous quotation is found, Glezer et al. go on to state, "The use of fans to globally or locally cool a heated environment often results in electromagnetic interference and noise generated by the magnetic-based fan motor." Their mentioning the magnetic-based fan motor clearly indicates that Glezer et al. were discussing the deficiencies of using a rotary fan, which is the same type of fan that is taught in Belliveau, to cool objects. After considering both of the references as a whole, one skilled in the art would not simply replace the fan disclosed in Belliveau with a synthetic jet disclosed in Glezer et al.

In discussing the synthetic jet actuator in FIG. 1C, Glezer et al. state that "a jet of ambient fluid 39 is synthesized by the vortices 34 creating strong entrainment of ambient fluid drawn from large distances away from the orifice 16." Col. 4, lines 55-57 (emphasis added). In discussing the synthetic jet actuator in FIGS. 2A-2C, Glezer et al. state that the "interaction between the fluid 64 moving out from under the blade 51 and the end 53 of the blade 51 creates a series of vortices (not depicted). These vortices roll up into vortex sheets that entrain additional ambient fluid to form a synthetic jet stream 64." col. 5, lines 45-49 (emphasis added). The control of the vortices is very difficult. Glezer et al. teach using a channel defined by walls to control the flow of fluid. See Col. 5, line 60. One would not simply implement the synthetic jet actuators of Glezer et al. as a forced air system into the lamp assembly of Belliveau without changing the principle of operation of Belliveau. Belliveau provides no teaching for controlling the complex vortices created by the synthetic jets taught in Glezer et al. Glezer et al. provides no teaching for cooling the

flexible substrate of Belliveau using a channel wall, which would most likely be rigid, that is attached to the flexible substrate.

In view of the above, Applicant respectfully submits that one skilled in the art would not combine Belliveau with Glezer et al. Accordingly, the Examiner has failed to establish prima facie obviousness with respect to claims 34 and 35.

Claims 36 and 37 have been added to the application. Claim 36 recites, among other things, a support mounted to said heat sink. Belliveau fails to disclose such a support. Furthermore, Belliveau fails to disclose that the LED conducts heat through the support into the heat sink. Accordingly, claim 36 and 37 are believed to patentably define over the references cited by the Examiner.

CONCLUSION

For the reasons detailed above, it is respectfully submitted all claims remaining in the application are now in condition for allowance. Accordingly, an early indication of the same is earnestly solicited. In any event, should the Examiner consider personal contact advantageous to the disposition of this case, he is encouraged to telephone the undersigned at the number listed below.

Respectfully submitted,

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April 27, 2006
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CERTIFICATE OF ELECTRONIC TRANSMISSION

I certify that this Amendment in connection with Application Serial No. 10/726,882 is being filed on the date indicated below by electronic transmission with the United States Patent and Trademark Office via the electronic filing system (EFS-Web).

Date

April 27, 2006

Signature

Audrey M. Dragony

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